भारतीय मानक
Indian Standard

IS 4001 : 2017

(Reaffirmed 2022)

खान टब — विशिष्टि

(तीसरा पुनरीक्षण)

Mine Tubs – Specification

(Third Revision)

ICS 73.020

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भारतीय मानक ब्यूरो
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July 2017 **Price Group 9**

Mining Techniques and Equipment Sectional Committee, MED 08

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Mining Techniques and Equipment Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1967 and revised in 1976 and 1995. In second revision, the standard referred to only one type of mine tubs used in some of the coal mines. But to ensure that the specification caters to the needs of the most of the mines in the country, the present revision encompasses most of the tubs being currently used in the country: A, B, C, D and E (Granby cars). New drawings have been added and text has been modified.

Directorate General of Mines Safety (DGMS) is the Regulatory Agency of the Government of India in matters pertaining to occupational safety, health and welfare of persons employed in mines. This standard has been prepared in consultation and in agreement with the statutory authorities under those rules. However, in case of any variance between the standard and circular(s) of DGMS, the latter shall override the provisions of the standard. The users of the standard are advised to check with relevant provisions of Mine Act and circulars of Statutory Authority applicable as on the date of use.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

Major changes in this revision are:

a) Type B, C, D and E (Granby cars) included.
b) Aluminium as one of the material for the manufacture of mine tubs has been removed as it is not used in underground coal mines.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

MINE TUBS — SPECIFICATIONS

(Third Revision)

1 SCOPE

This standard specifies the requirements for mine tubs of capacity 1.2 m^3 (Type 'A'), 56.25 cft (Type 'B'), 67.5 cft (Type 'C'), 0.68 m^3 (Type 'D') and 2.4 m^3 (Type 'E'-GRANBY); Rail Gauge : 610mm.

2 REFERENCES

The following standards contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
210 : 2009	Grey Iron castings (*fifth revision*)
276 : 2000	Austenitic manganese steel castings (*fifth revision*)
808 : 1989	Dimension for hot rolled steel beam, column, channel and angle sections (*third revision*)
1030 : 1998	Carbon steel castings for general engineering purposes (*fifth revision*)
1570 (Part 2/ Sec 1) : 1979	Schedule for wrought steels: Part 2 Carbon steels (unalloyed) steels, Section 1 Wrought products (other than wire) with specified chemical composition and related properties (*first revision)*
1875 : 1992	Carbon steel billets blooms, slabs and bars for forgings (*fifth revision*)
2062 : 2011	Hot Rolled Medium and High Tensile Structural Steel (*seventh revision*)
2708 : 1993	1.5 percent manganese steel castings for general engineering purposes (*third revision*)
8534 (Part 1) : 2014	Mine tub couplings and Draw bars for use in Mines : Part 1 Specification (*third revision*)
14329 : 1995	Malleable iron castings

3 CONSTRUCTION

3.1 Dimensions

a) A typical mine tub and its components of Type 'A' are shown in Fig. 1a to Fig. 1e;

b) A typical mine tub and its components of Type 'B' are shown in Fig. 2a to Fig. 2e;

c) A typical mine tub and its components of Type 'C' are shown in Fig. 2c to Fig. 2e and Fig. 3a to Fig. 3b;

d) A typical mine tub and its components of Type 'D' are shown in Fig. 4a to Fig. 4c; and.

e) A typical mine tub and its components of Type 'E' are shown in Fig. 5a to Fig. 5h.

3.2 Wheels

Dimensions of the wheels of the mine tubs shall be as follows:

Item	*Types A, B and C* mm	*Type D* mm	*Type E* mm
Diameter on tread, min	300	327	305
Width on tread, min	65	68	69
Diameter on flange, min	340	377	360
Mean thickness of ring	10	21	20
Projection of boss on tread side	Nil	Refer drawing	Refer drawing
Projection of boss on flange, max	25	Refer drawing	Refer drawing

3.3 Axles

3.3.1 The diameter of axle of mine tubs shall be a minimum of 50 mm with respect to Types A,B and C; 56 mm square bar with respect to Type D and 80 mm with respect to Type E – Granby Car.

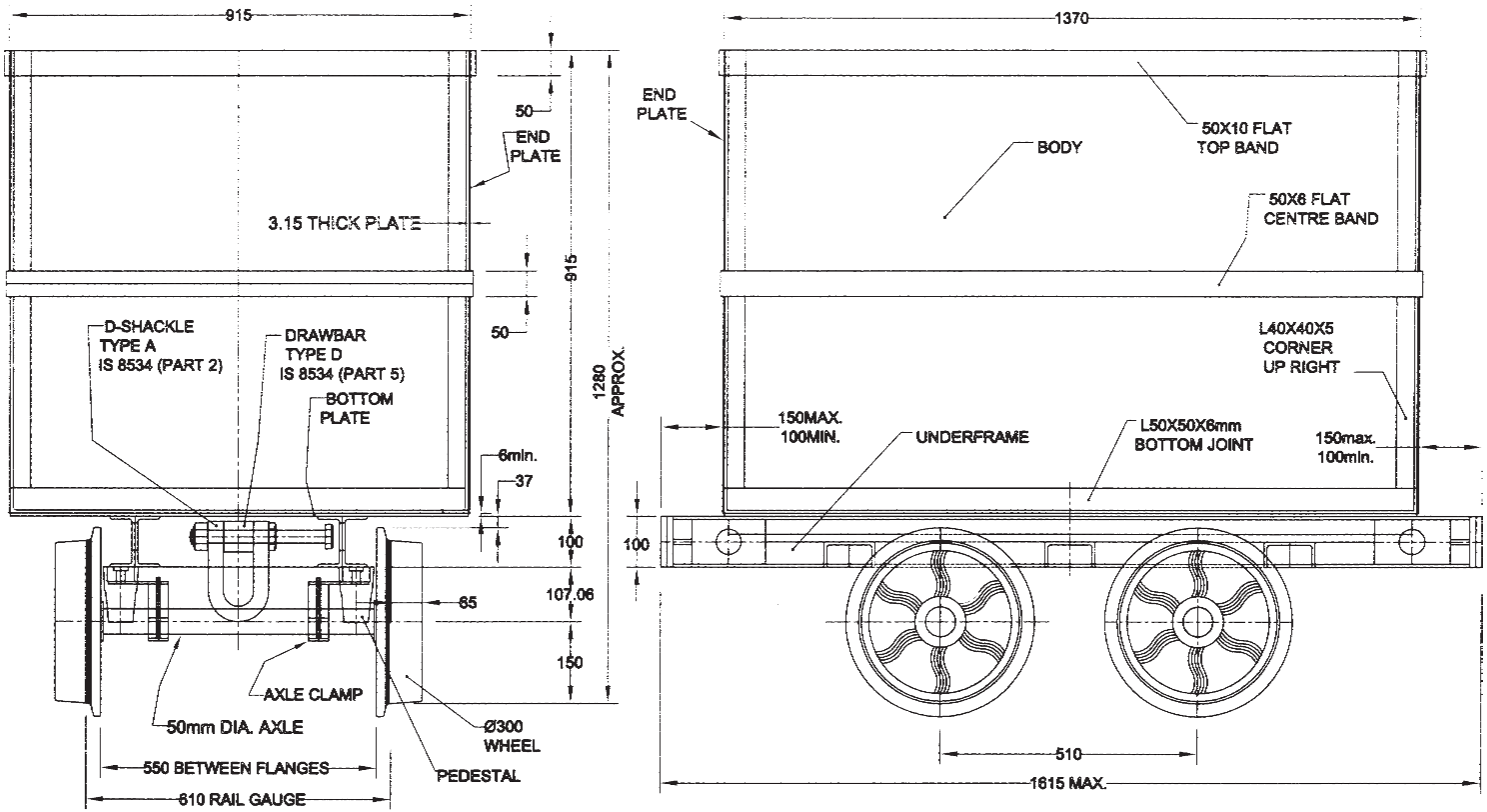
3.3.2 The straightness of the axle when measured from a flat surface shall not deviate more than 1.6 mm.

3.4 Draw Gear

The draw gear fitted with the mine tubs shall have the dimensions and specifications, as enumerated in the relevant type of the Mine Tub Couplings and Drawbars viz. IS 8534 (Types A to F).

4 MATERIAL

The material used in the manufacture of tubs shall be as specified in Table 1.

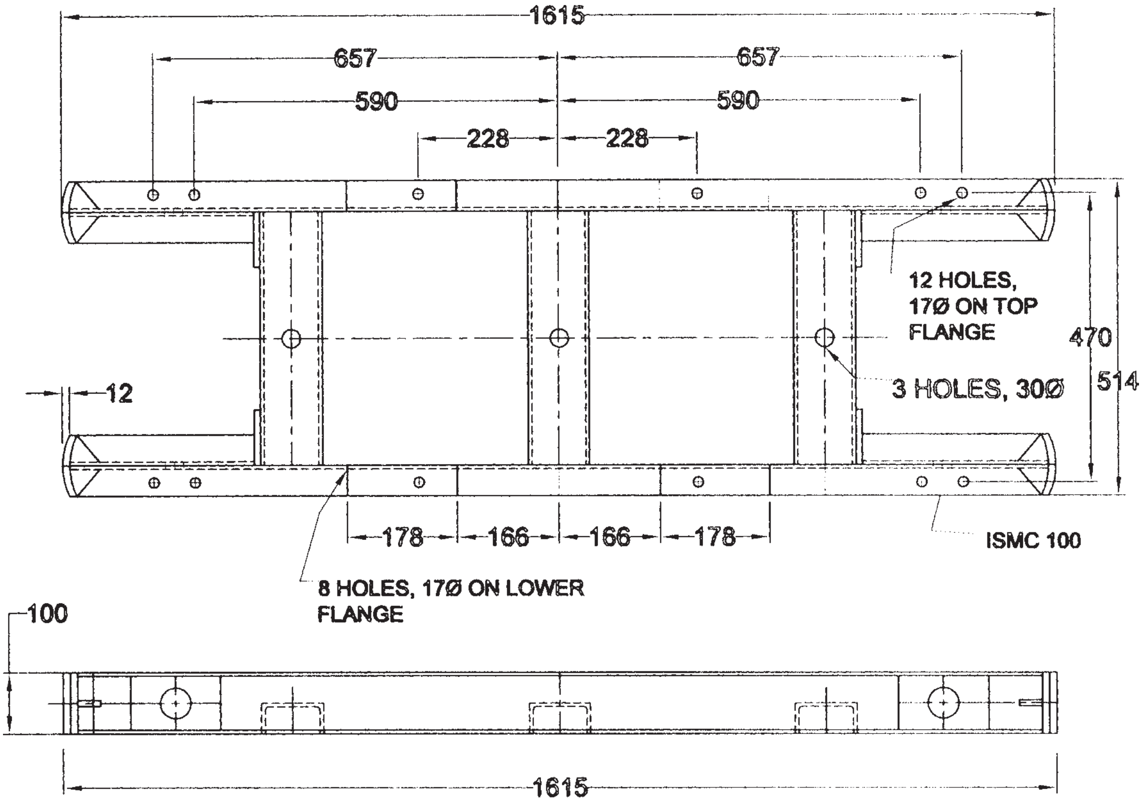


NOTE

Figure shows drawbar of TYPE D conforming to IS 8534 with D Shackle comforming to TYPE A, IS 8534. Alternatively drawbar of Type D conforming to IS 8534 with coupling conforming to TYPES A & B, IS 8534 or drawbar of Type C conforming to IS 8534 with coupling conforming to TYPE C, IS 8534 may be used.

All dimensions in millimetres.

FIG. 1A DETAIL OF COAL MIME TUB



UNDERFRAME

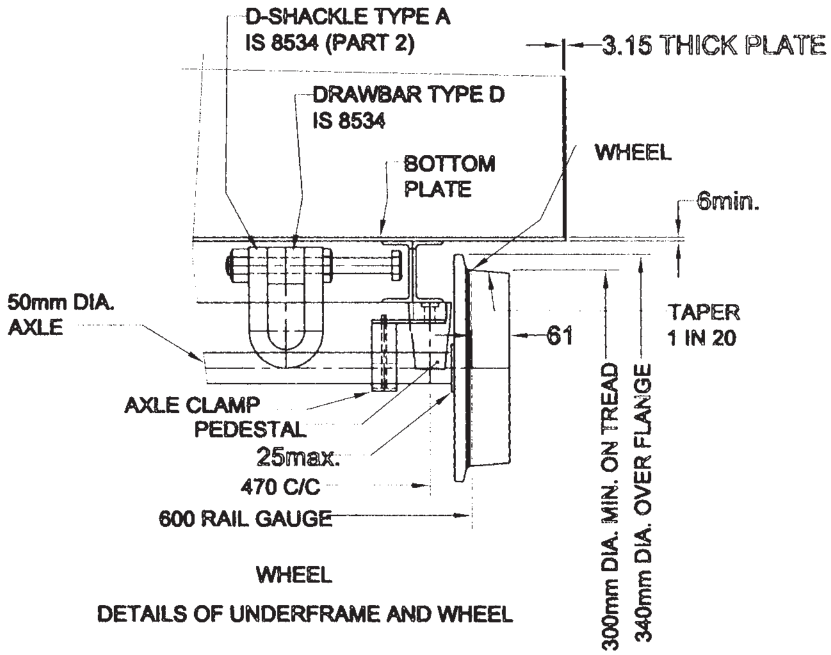


FIG. 1B DETAIL OF UNDERFRAME & WHEEL

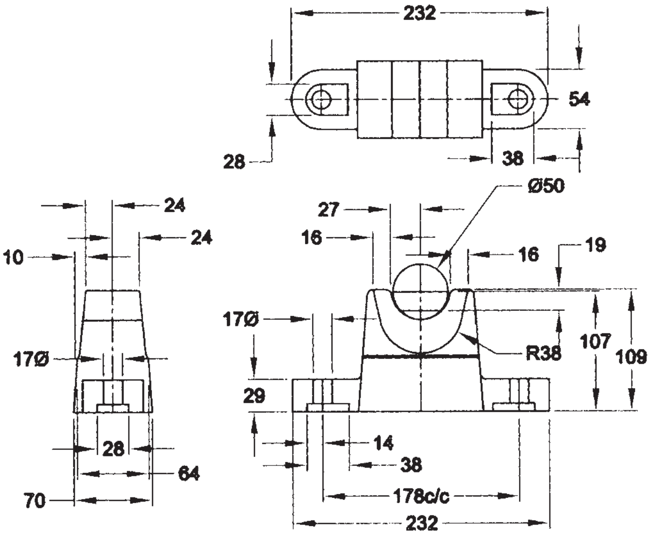
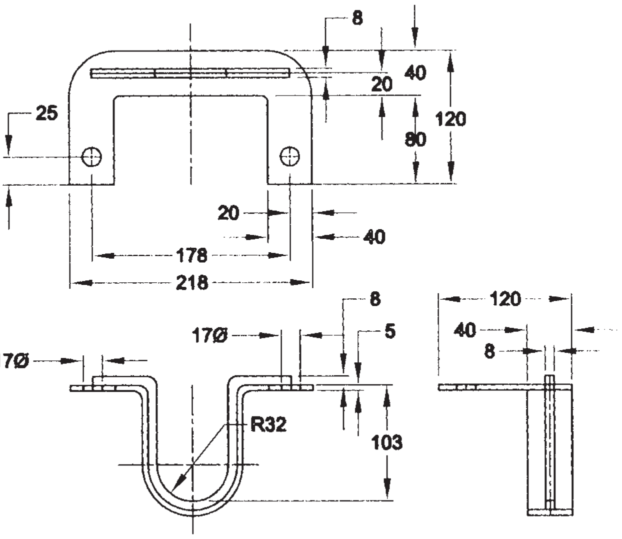


Fig. 1C For Pedestals, Type A



E

Fig. 1D For Axle Clamp Type A

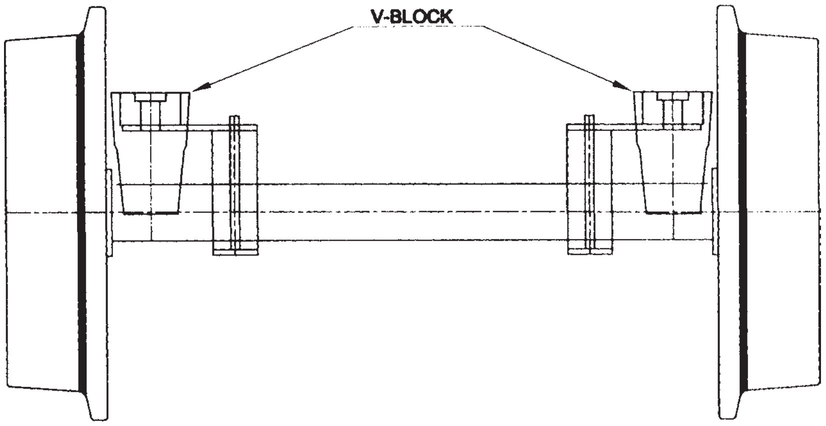
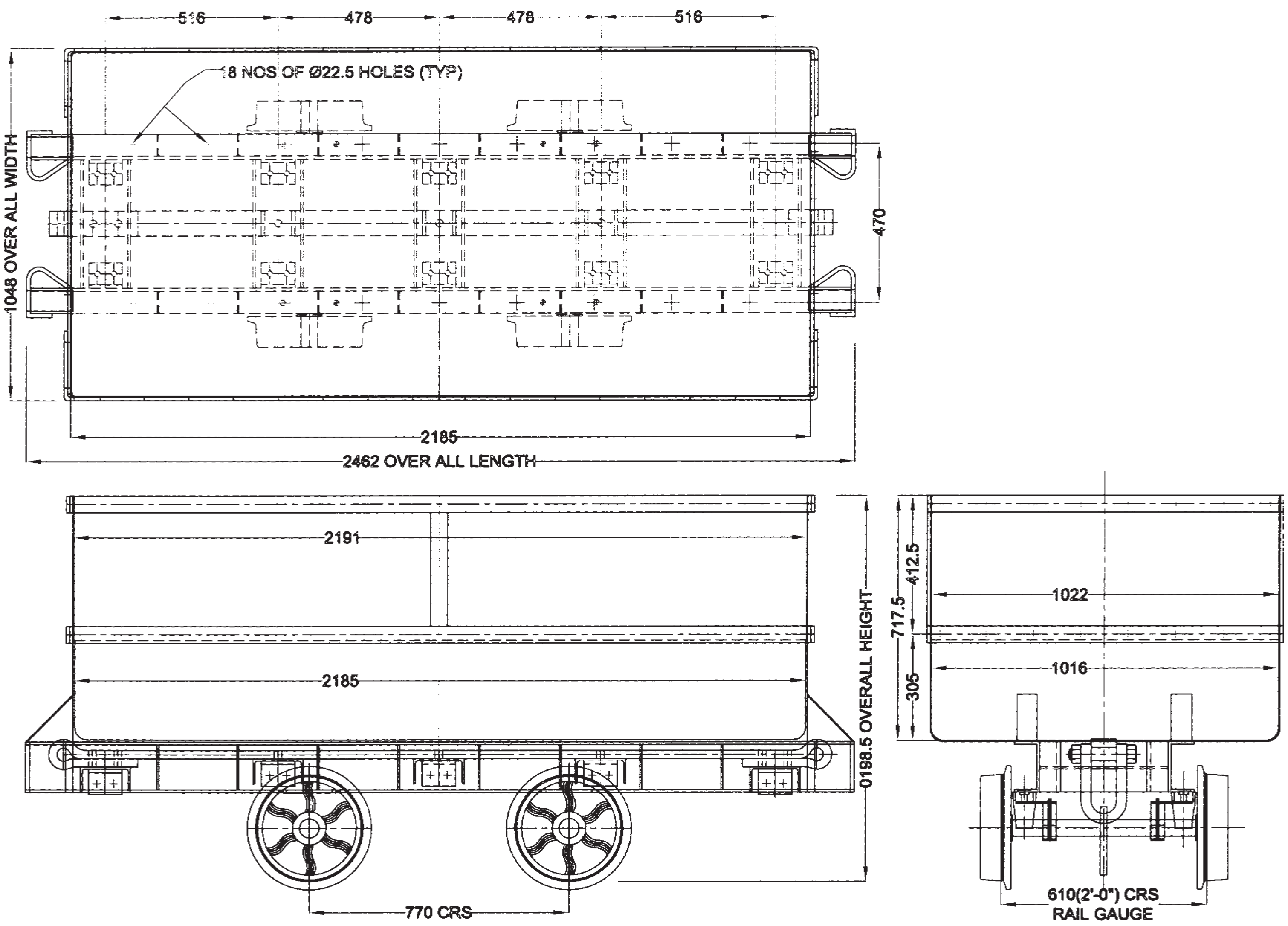


Fig. 1E Eccentricity Test Type A

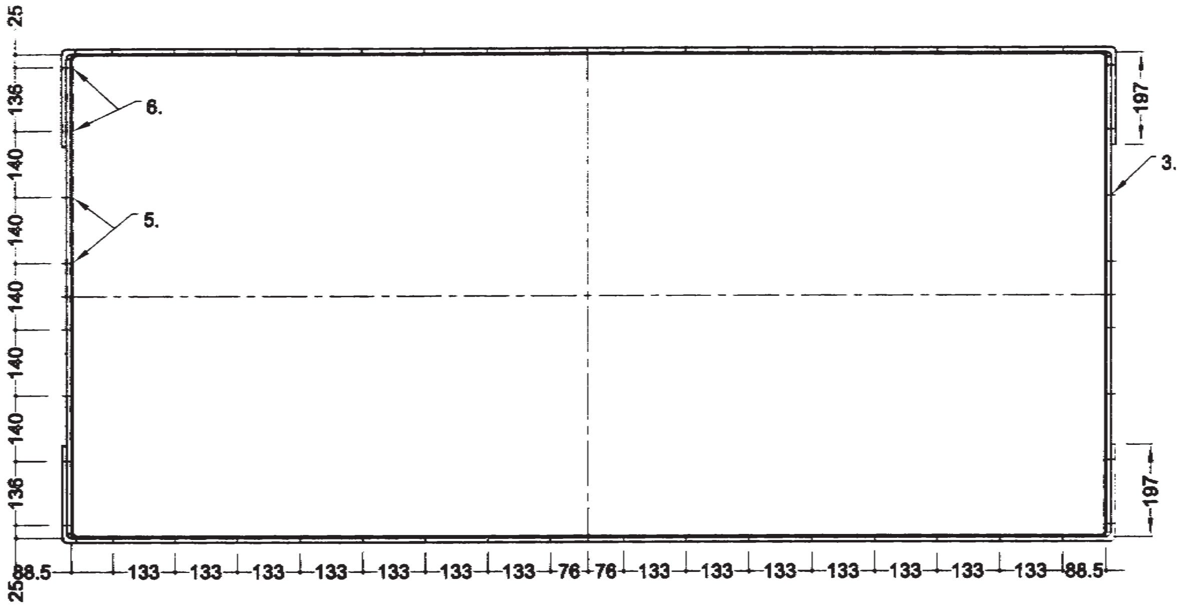
All dimensions in millimetres.

Fig. 1C, 1D and 1E Detail of Pedestals, Axle-Clamp

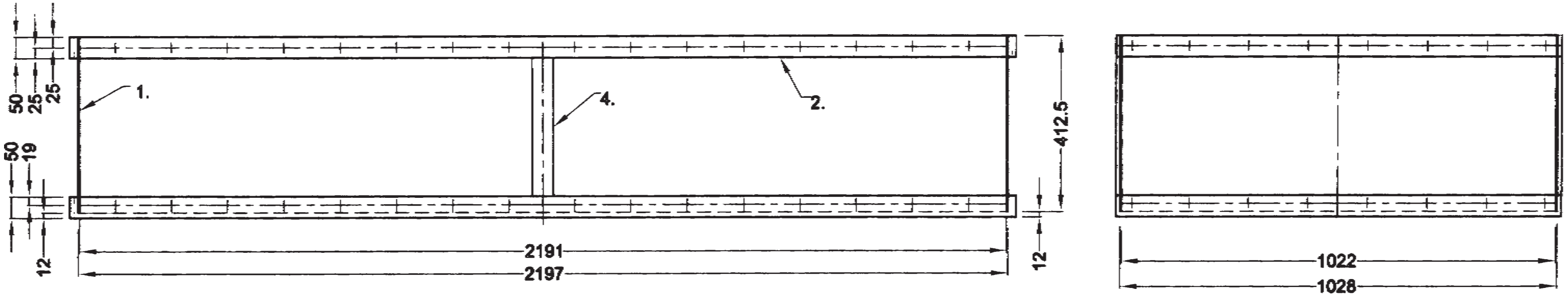


All dimensions in millimetres

FIG. 2A GENERAL ASSY. FOR LHLC COAL TUB 56.25 eft. CAPACITY

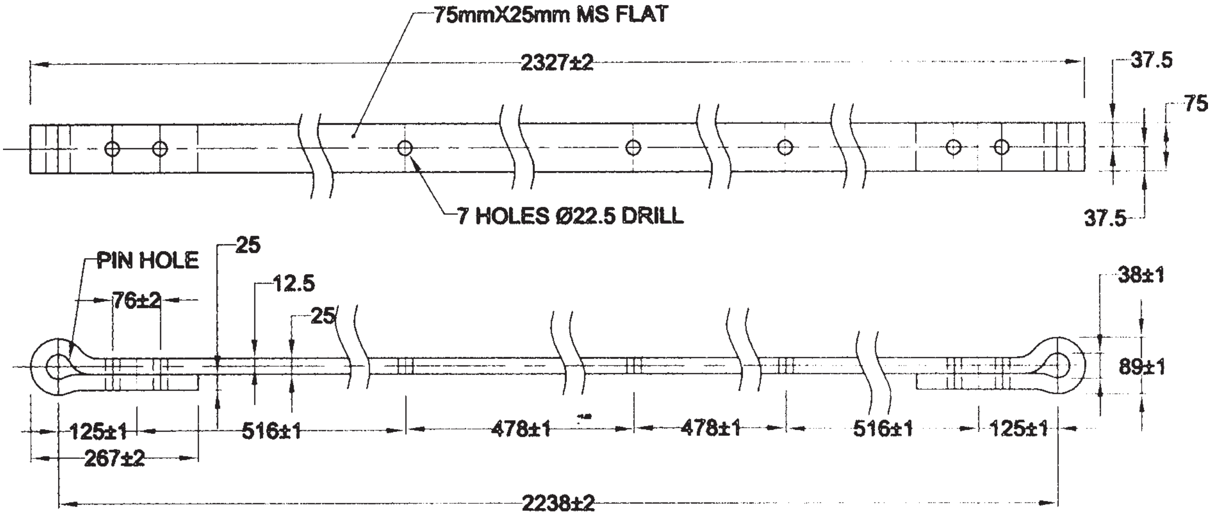


ITEM No.	NAME OF MATERIAL	MATERIAL SIZE	QTY. REQD.	WT./ ITEM In Kg.	TOTAL WT. In Kg.
1	TOP BODY IN TWO HALVES	3.15mm MS PLATE IS:1079	2	44.00	88
2	TOP & BOTTOM RINGS	10X50mm MS PLATE IS:2062	4	3.9 Kg./ mtr.	19.936
3	STIFFNERS	10X50mm MS FLAT IS:2062	4	3.9 Kg. / mtr.	16.036
4	BRACINGS	10X50mm MS FLAT IS:2062	2	3.9 Kg. / mtr.	3.210
5	SNAP HEAD RIVET	10X30 MS RIVET	80	0.02	1.680
6	SNAP HEAD RIVET	10X40 MS RIVET	16	0.03	0.480



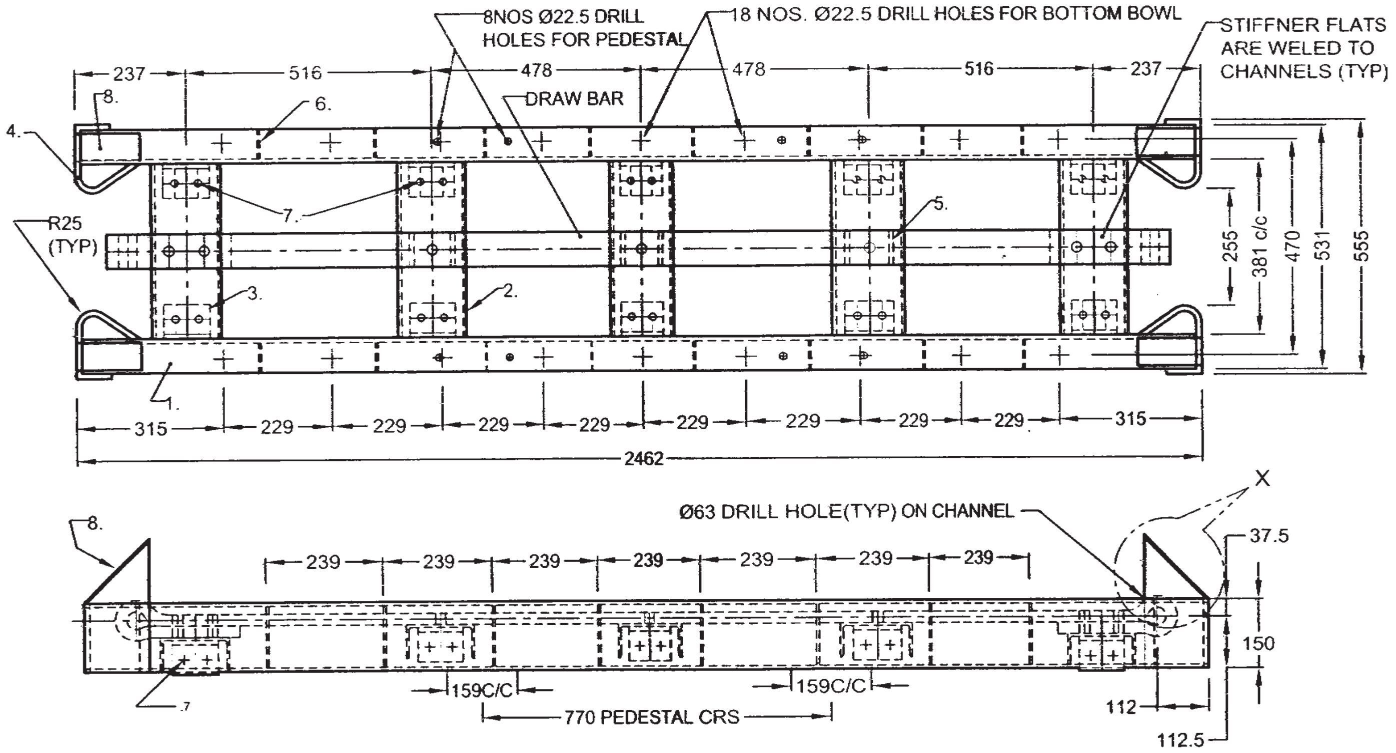
All dimensions in millimetres.

FIG 2B TOP FOR LHLC COAL TUB 56.25 CFT.

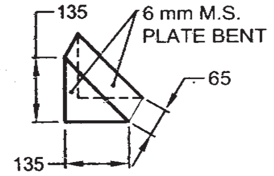


All dimensions in millimetres.

FIG. 2D DRAW BAR FOR COAL TUB TYPE B & C 56.25 EFT. & 67.5 EFT CAPACITIES



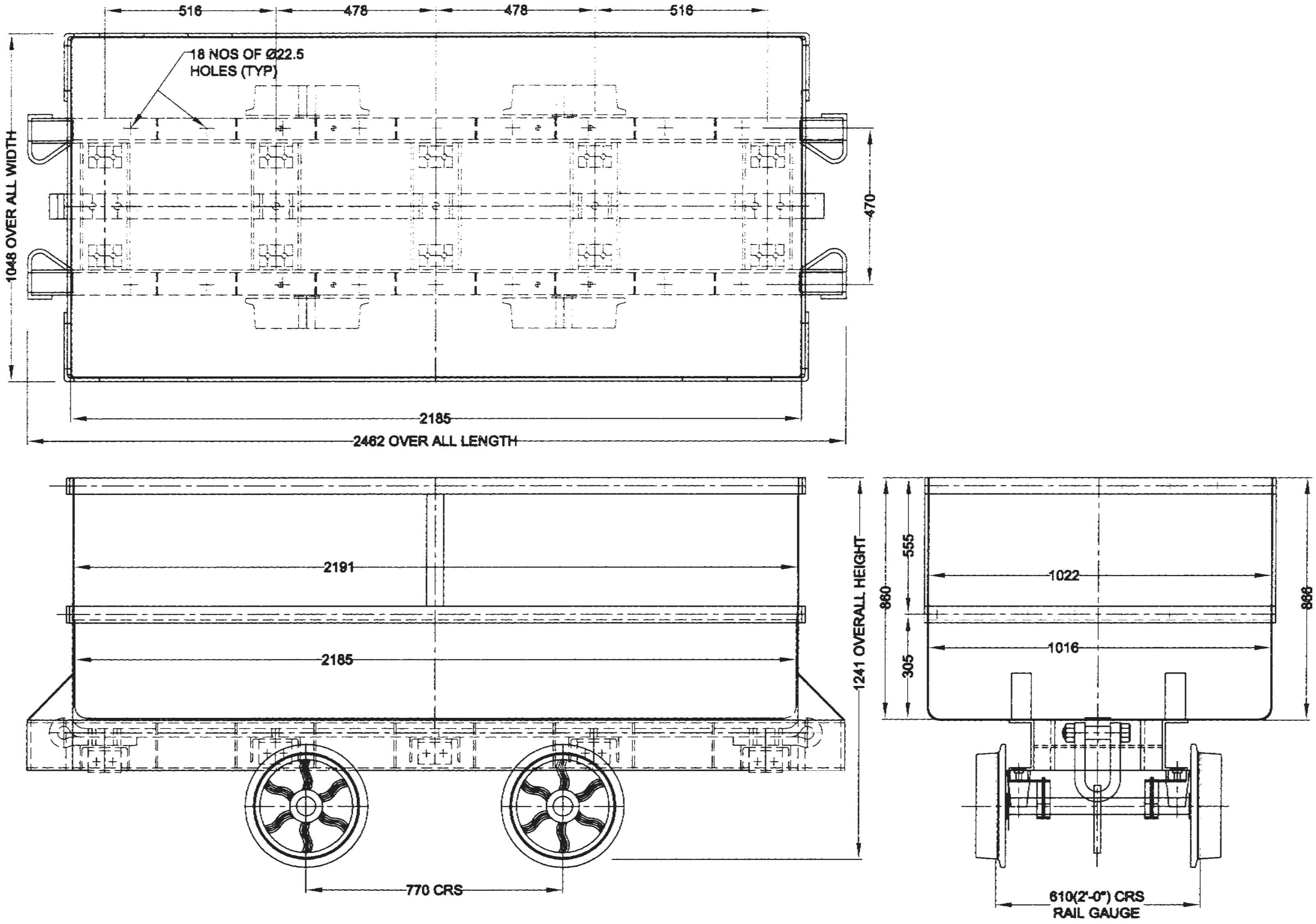
ITEM NO.	NAME OF THE ITEM	MATERIAL & SIZE	NOS	Approx Wt of each in Kg.	Approx Total Wt in Kg.
1.	CHASSIS CHANNEL (BIG)	2438 LONG 150X75X6 M.S.CHANNEL	2	39.983	79.966
2.	CHASSIS CHANNEL (SMALL)	381 LONG 150*75*6 M.S.CHANNEL	5	6.250	31.250
3.	CLEAT FOR ABOVE	100 LONG 75*75*10 M.S.ANGLE	10	1.100	11.000
4.	BUFFER	325 LONG 150*12 M.S.FLAT	4	4.582	18.328
5.	STIFFNER (BOTTOM SIDE)	100 LONG 75*10 M.S.FLAT	5	0.590	2.950
6.	STIFFNER (VERTICAL)	140 LONG 70*6 M.S.PLATE	16	0.462	7.392
7.	CUP HEAD RIVET	50 LONG Ø16 CUP HEAD RIVET	40	0.110	4.400
8.	TRIANGULAR BOX (3 PLATE) (TO BE WELDED)	135x135x6 TRIANGULAR PLATE-2NOS. 180*65*6 M.S.PLATE-1 NO.	4 SETS	1.470	5.880



DETAL AT 'X' O ANTI-SET RIDING TRIANGULAR BOX

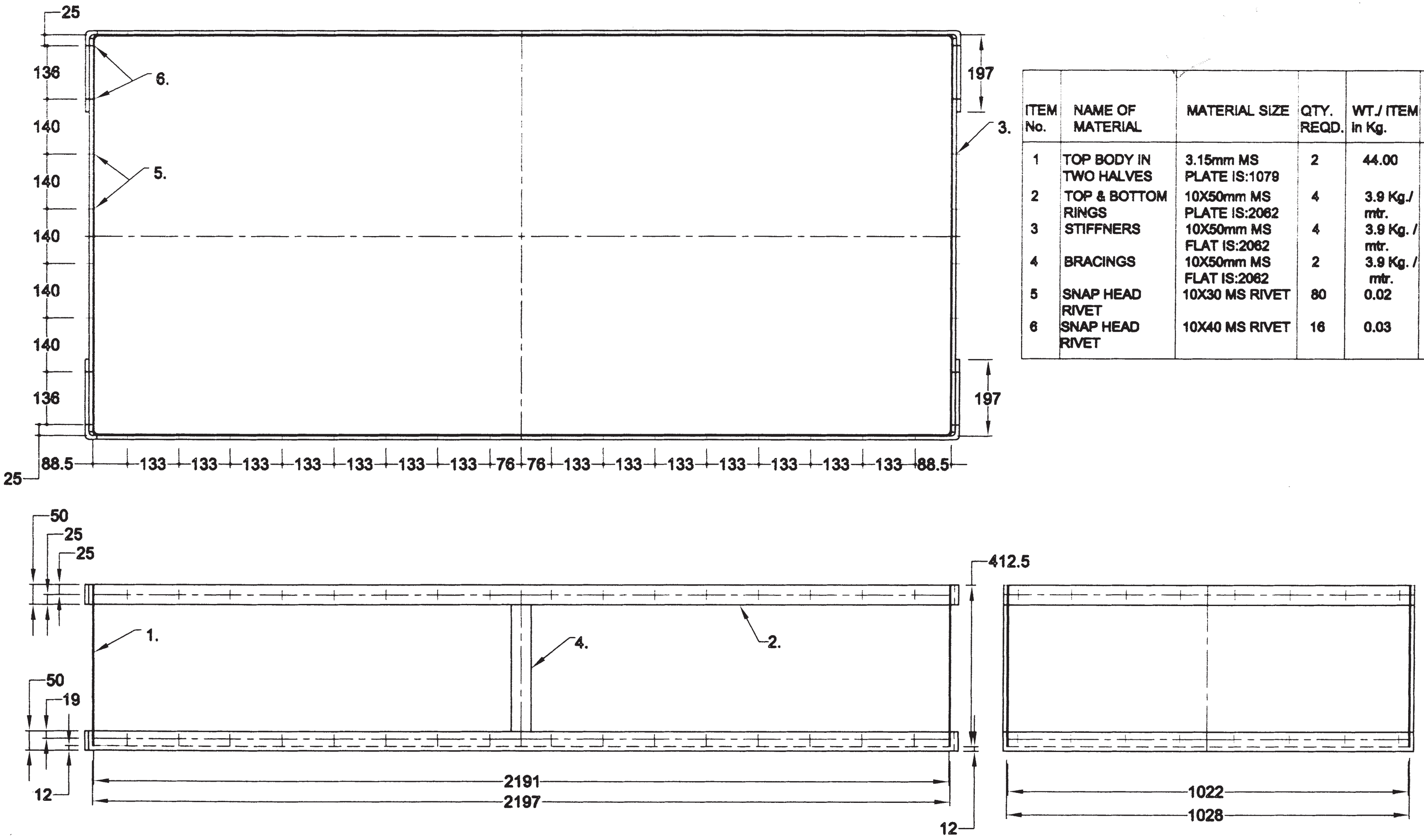
All dimensions in millimetres.

FIG. 2E CHASSIS FRAME FOR COAL TUB TYPE B & C 56.25 EFT & 67.5 EFT CAPACITIES



All dimensions in millimetres.

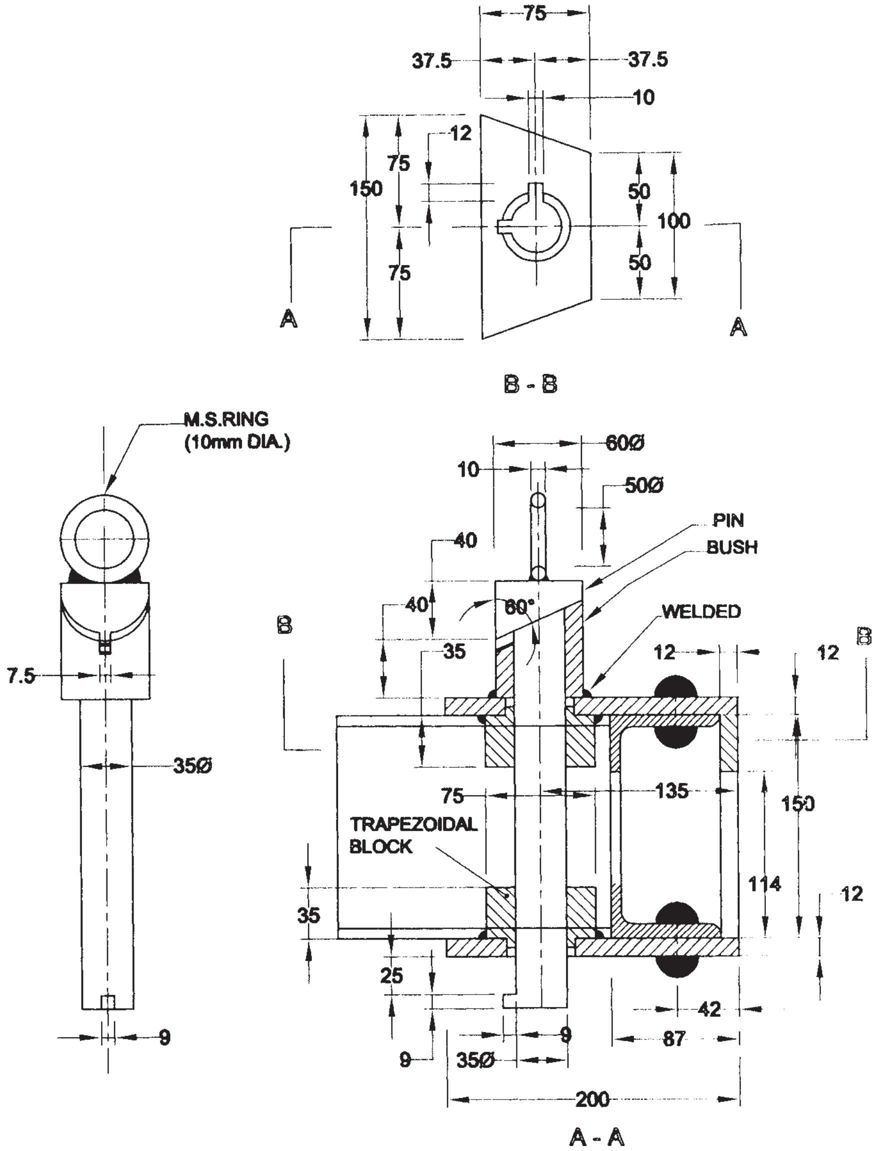
FIG. 3A GENERAL ASSY. FOR LHLC COAL TUBTYPE C 67.5 EFT CAPACITY



ITEM No.	NAME OF MATERIAL	MATERIAL SIZE	QTY. REQD.	WT./ ITEM in Kg.	TOTAL WT. in Kg.
1	TOP BODY IN TWO HALVES	3.15mm MS PLATE IS:1079	2	44.00	88
2	TOP & BOTTOM RINGS	10X50mm MS PLATE IS:2062	4	3.9 Kg./ mtr.	19.936
3	STIFFNERS	10X50mm MS FLAT IS:2062	4	3.9 Kg. / mtr.	16.036
4	BRACINGS	10X50mm MS FLAT IS:2062	2	3.9 Kg. / mtr.	3.210
5	SNAP HEAD RIVET	10X30 MS RIVET	80	0.02	1.680
6	SNAP HEAD RIVET	10X40 MS RIVET	16	0.03	0.480

All dimensions in millimetres.

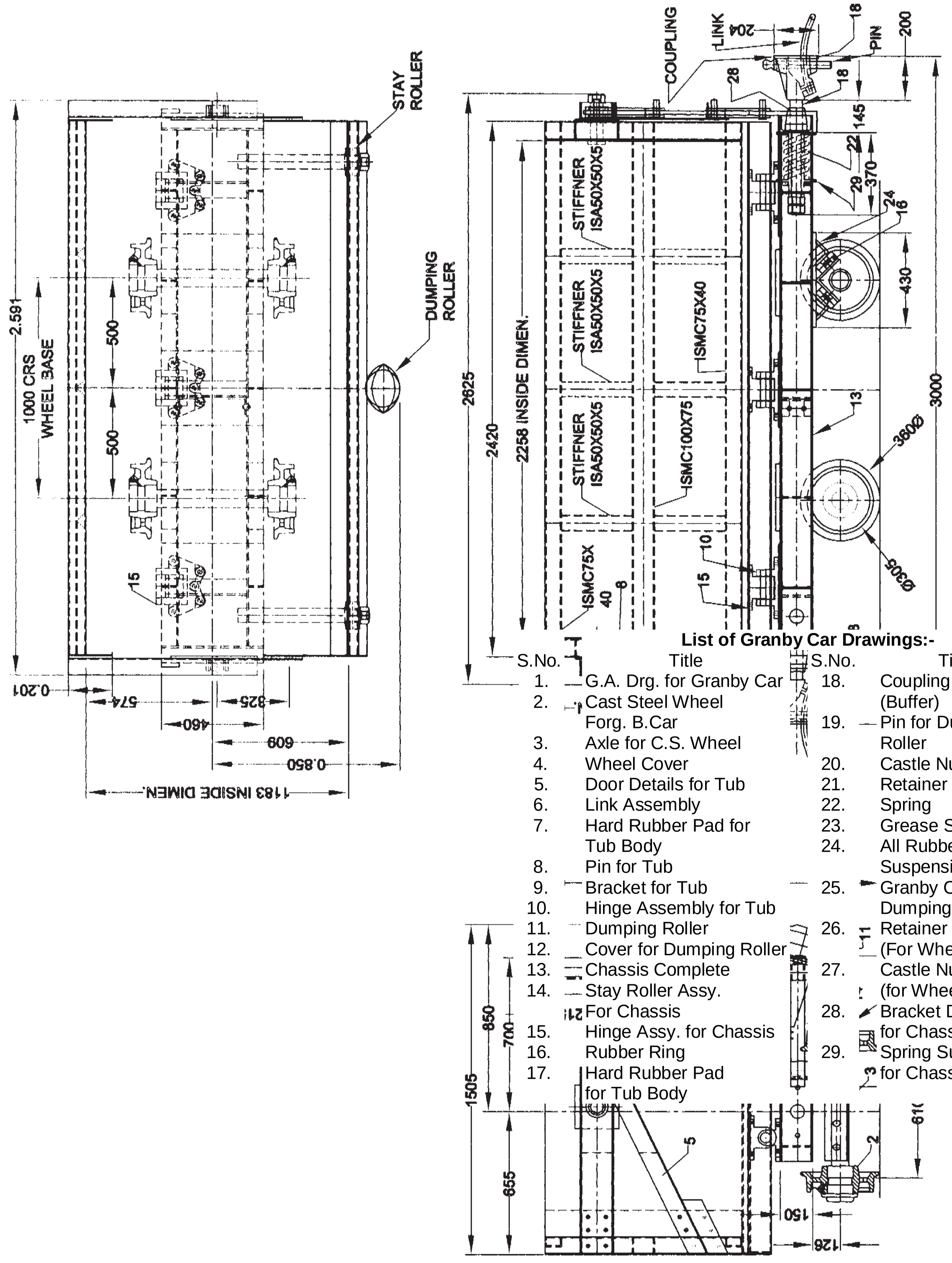
FIG. 3B TOP FOR LHLC COAL TUB 67.5 CFT



Sl. No	Description	Material	Qnty.
A	Pin	1.5Mn. Steel	2Nos.
B	Taper Bush	Mild Steel	2 Nos.
C	Trapezoidal Block with Male & Female Recepetacle	Mild Steel	4 Nos.

All dimensions millimetres

Fig. 4B Detail of Tub Coupling Arrangement for 24 eft Tub

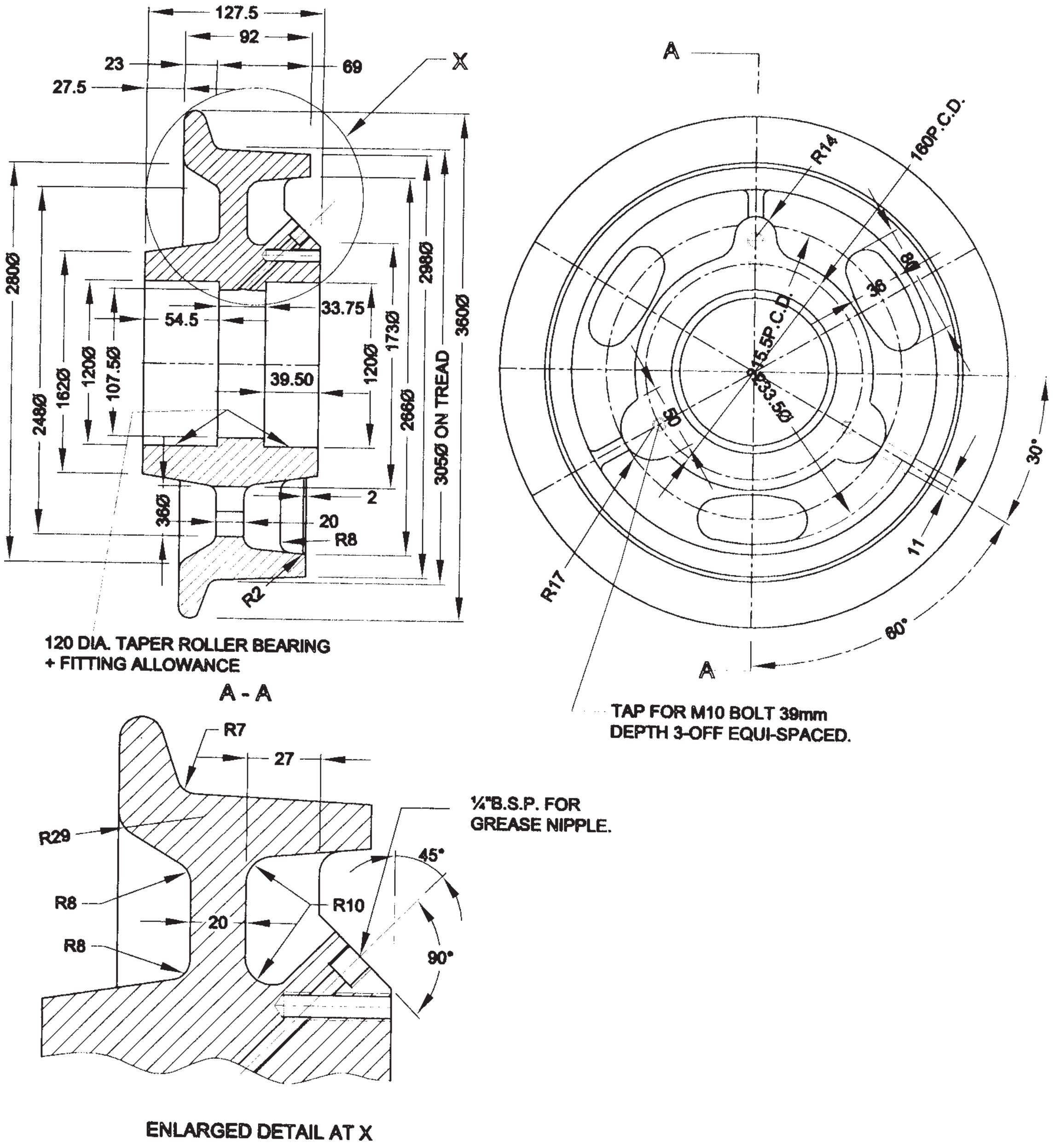


List of Granby Car Drawings:-

S.No.	Title	S.No.	Title
1.	G.A. Drg. for Granby Car	18.	Coupling Assy. (Buffer)
2.	Cast Steel Wheel Forg. B.Car	19.	Pin for Dumping Roller
3.	Axle for C.S. Wheel	20.	Castle Nut
4.	Wheel Cover	21.	Retainer
5.	Door Details for Tub	22.	Spring
6.	Link Assembly	23.	Grease Seal
7.	Hard Rubber Pad for Tub Body	24.	All Rubber Suspension
8.	Pin for Tub	25.	Granby Car Dumping Ramp
9.	Bracket for Tub	26.	Retainer (For Wheel & Axle)
10.	Hinge Assembly for Tub	27.	Castle Nut (for Wheel & Axle)
11.	Dumping Roller	28.	Bracket Det. for Chassis
12.	Cover for Dumping Roller	29.	Spring Support for Chassis
13.	Chassis Complete		
14.	Stay Roller Assy. For Chassis		
15.	Hinge Assy. for Chassis		
16.	Rubber Ring		
17.	Hard Rubber Pad for Tub Body		

s in millimetre.

AWING FOR GRANBY CAR TYPE E

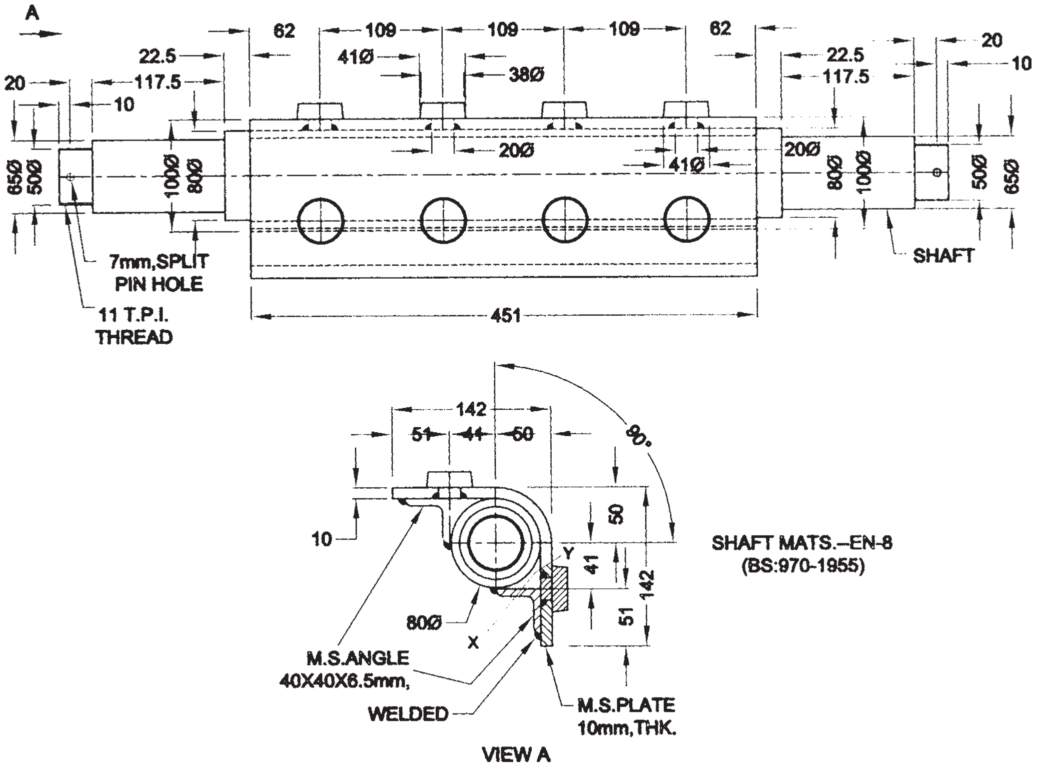


Material

Cast Steel Qr.1.1.S: 1030-1982.

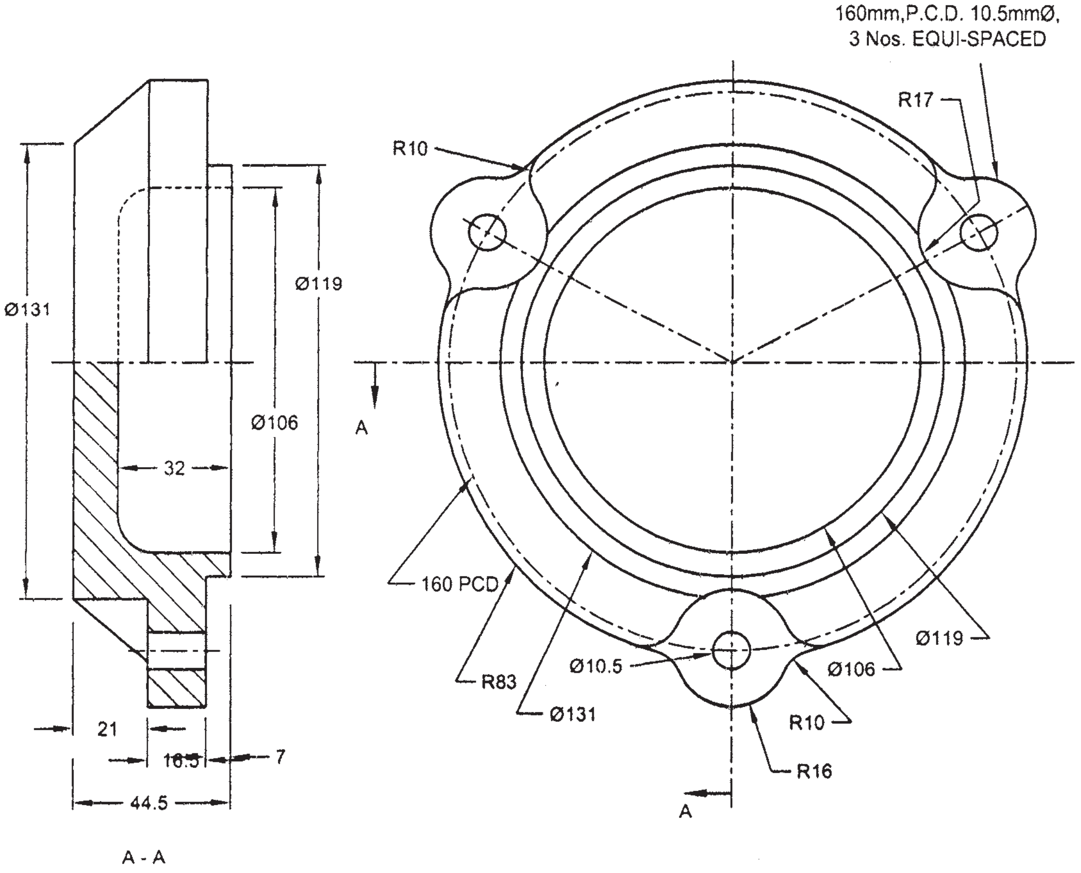
All dimensions in millimeres.

FIG. 5B CAST STEEL WHEEL FOR GRANBY CAR, TYPE E



All dimensions in millimetres.

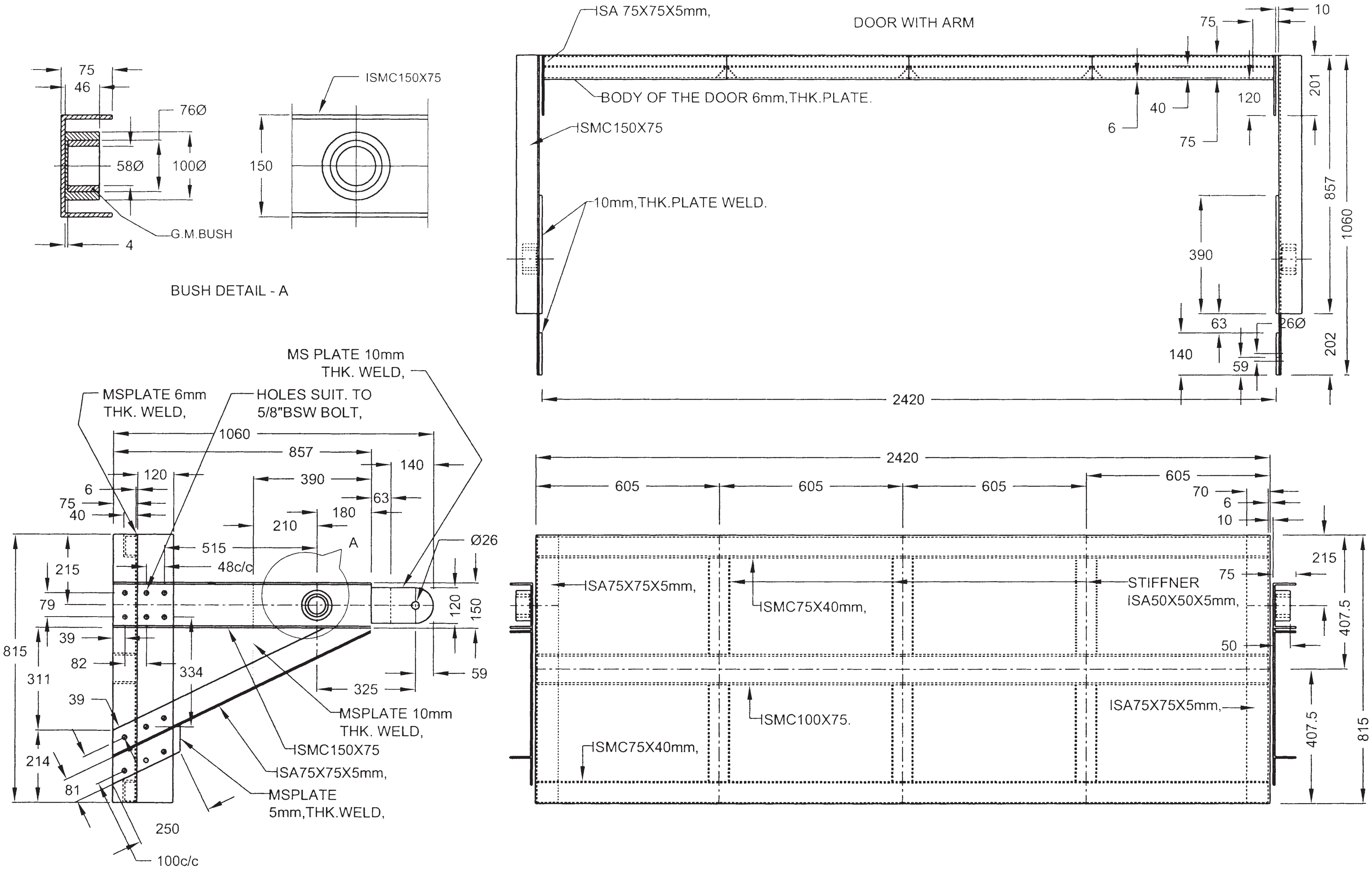
FIG. 5C AXLE FOR C. S. WHEEL OF GRANBY CAR



Material- Cast Steel

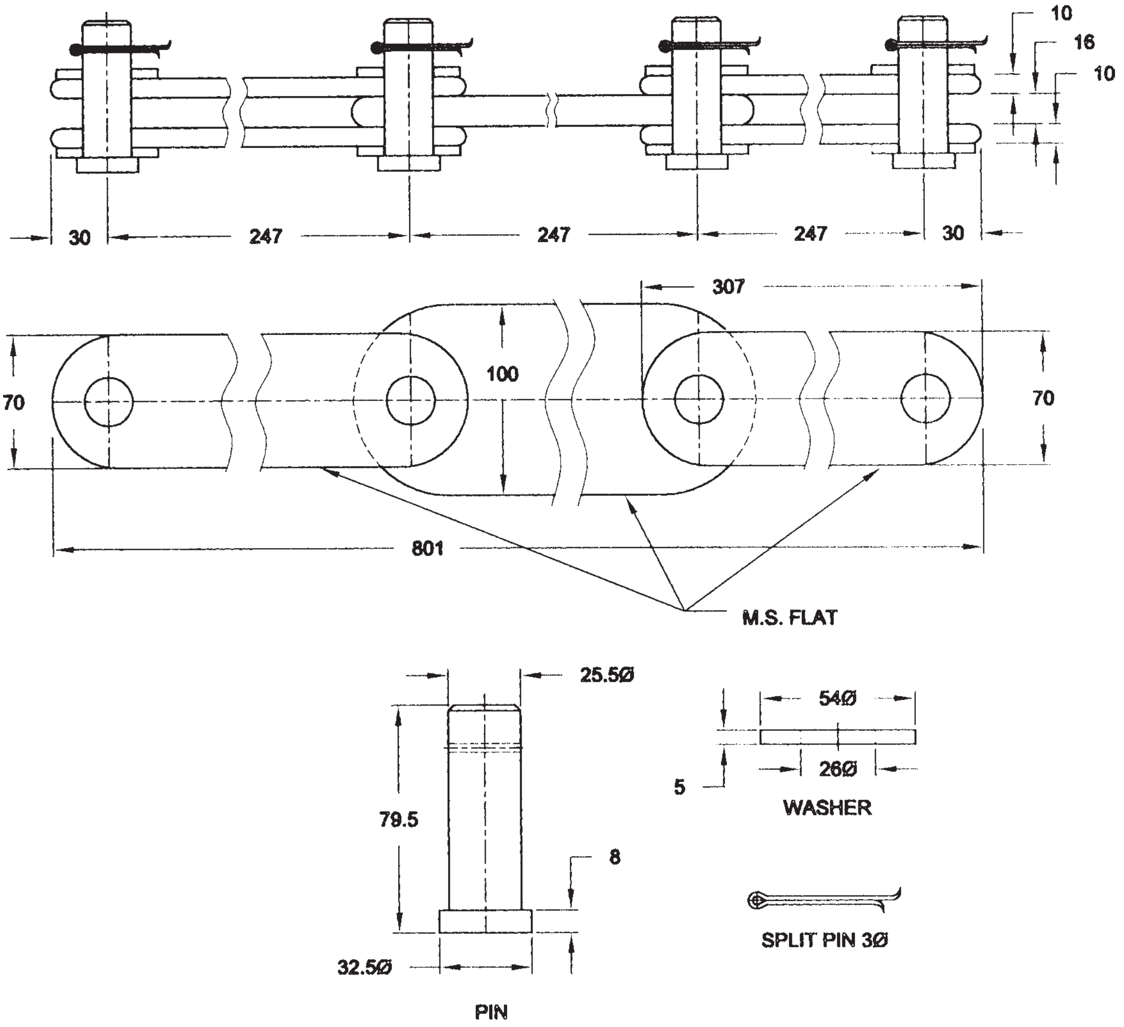
All dimensions in millimetres.

FIG. 5D WHEEL COVER FOR GRANBY CAR TYPE E



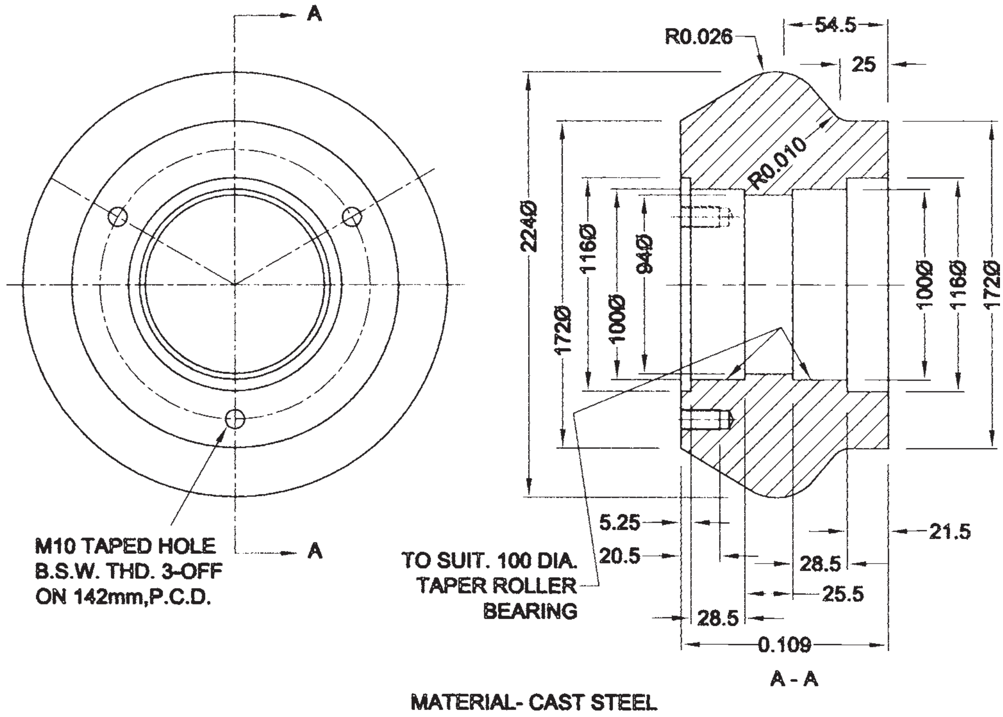
All dimensions in millimetres.

FIG. 5E DOOR DETAILS FOR TUB OF GRANBY CAR TYPE E



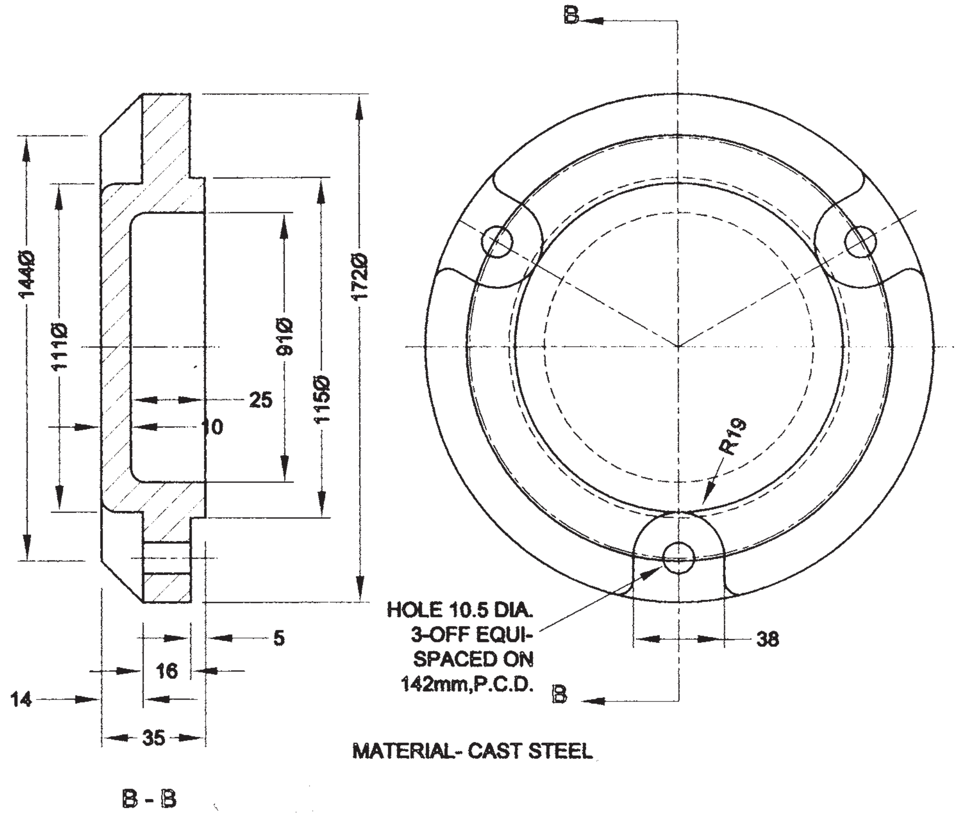
All dimensions in millimetres.

Fig. 5F Link Assy. for Granby Car Type E



All dimension in millimetres.

FIG. 5G DUMPING ROLLER FOR GRANBY CAR TYPE E



All dimension in millimetres.

FIG. 5H DUMPING ROLLER FOR GRANBY CAR TYPE E

Table 1 Material for Components of Tubs

(*Clause* 4)

Sl No. (1)	Component (2)	Material (3)
i)	Bodies and under frame	Steel Grade A of IS 2062
ii)	Wheels	a) Steel IS 1030; or b) Grade 3 of IS 2708; or c) IS 276
iii)	Pedestals	a) IS 1030 or b) Grade FG260 of IS 210 or c) Grade A of IS 2107 or d) Engineering Plastic conforming to Nylon.6, filler content: 0.2731 percent, density: 1.135 gm/cc, melting point: 200-220 °C, melt flow index: 4.26 gm/10 min, tensile stress at yield: 65-70 N/mm^2, elongation at break: 15-20 per cent, tensile modulus at elasticity: 2 500-3 000 N/mm^2
iv)	Axles	45C8 of IS 1570 (Part 2/Sec 1) or Class 4 of IS 1875
v)	Axle Clamps	IS 2062

5 GENERAL REQUIREMENTS

5.1 General

5.1.1 The ancillary handling equipment shall be well within the confines of the buffers.

5.1.2 All the holes in the draw gear and under frame shall be made by drilling and not by punching.

5.2 Body

5.2.1 Bodies shall be either of riveted or welded construction, at the option of the purchaser. The bodies made of plates of minimum thickness as per the drawing, shall be adequately supported on the under frame by riveting or on trunnion, as shown in the drawing or at the option of the purchaser.

5.2.1.1 Internal reinforcing flats or plates shall be welded to the bottom plate. If absolute cleanliness of interior is required, the bodies shall be either welded to the under frame or shall have cleats welded outside the body for riveting to the under frame.

5.2.2 Vertical corners shall be well rounded or beveled and lapping of side and end plates shall be so arranged as to give the minimum projection.

5.2.3 Top edges of body shall be either of rounded or of beveled contour or shall be reinforced at the top by suitable angles, the toes of which shall be continuously welded to the plates.

5.2.3.1 All types of reinforcements shall be continuous at the vertical joint of the plates.

5.2.4 The bodies shall be, as far as possible, free from internal projections. Stiffening, corrugations running round the body are however, permissible but shall be designed to give an unrestricted flow of material.

5.2.5 The bodies shall not have any sharp edges which may cause personal injury.

5.2.6 Where tubs are to be used on over rope or over chain haulage system, the upper edge of the end plates shall be fitted with renewable wearing strips.

5.2.7 If required by purchaser, minimum of two plug holes shall be provided for proper drainage.

5.3 Under Frame

5.3.1 The longitudinal members of steel under frames shall be made of standard channels section conforming to IS 808. Other members shall be made of channel or angle sections conforming to IS 808 or IS 811 and shall be either riveted or welded to the longitudinal members.

5.3.1.1 For longitudinal members, channel sections made from plates, flats or strips 6 mm thick or more may be used.

5.3.2 The buffer pieces shall be fixed on the inside of the longitudinal members.

5.3.3 The steel plates of thickness 12 mm or more shall be either riveted, bolted or welded to the main under frame member to form the buffer face. To absorb buffing shocks, timber, rubber pads, springs or proprietary units of similar nature may be inserted between the buffer face and the main under frame member.

5.3.3.1 Buffer faces shall be strengthened by welding cleats to it.

5.3.4 Holes shall be made in the under frame to facilitate the changing of pin of draw bar shackle.

5.3.4.1 The area around the hole shall be strengthened by welding plates on both sides of the hole.

5.4 Draw Gear

5.4.1 The draw gear shall conform to IS 8534, in all respects.

5.4.2 The draw gear shall preferably consist of a continuous draw bar with attachments at each end and shall be of such a design that as far as possible, a straight pull through the axis of the draw bar is obtained.

5.4.3 The draw bars shall be attached to the under frame by means of rivets.

5.4.4 The attachments shall be flexible to allow free movement on sharp curves, shall be securely connected to the draw bar and whenever practicable, easily replaceable.

5.4.5 The draw bars of lapped design shall have the lapped portion riveted and side welded on both sides, using, either automatic flash butt welding or atomic hydrogen welding process.

5.4.6 The tub coupling arrangement with respect to Type 'D' shall be as per Fig. 4b. The couplings shall be provided on both the sides of the tub.

5.5 Wheel and Axles

5.5.1 The wheels shall be press fitted on the axles. After fitting the wheels, the axles shall be riveted on the wheels or located by a nut and a split pin.

5.5.1.1 The riveted projection of the axle shall not exceed 6mm. Drawings may be referred for other details.

5.6 Any details required by the manufacturer or the customer, in addition to what is provided in this standard with respect to drawings and/or text shall be decided mutually between the two.

6 HEAT TREATMENT

6.1 Wheels

6.1.1 *Carbon and Pearlitic Manganese Steel castings*

All castings shall be supplied in the heat treated condition. The heat treatment shall consist of annealing, normalizing or hardening and tempering and shall be carried out at a suitable temperature to give the required mechanical properties.

6.1.2 *Austenitic Manganese Steel Castings*

All castings shall be supplied in the heat treated condition, having been water quenched from a temperature of not less than 1000°C.

6.2 Draw Gear

6.2.1 Draw gear of mine tubs shall be heat treated as specified in IS 8534. The details of the heat treatment given to the components of the draw gear shall be endorsed on the certificate of test in accordance with IS 8534.

7 TESTS

7.1 Destructive test and proof load tests shall be carried out on draw gear in accordance provisions of IS 8534. A certificate of test shall be supplied with each batch in accordance with IS 8534.

7.2 Non destructive test namely, magnetic particle crack detection and Ultra sonic flaw detection shall be carried out for self locking tub coupling (consisting of one pin, two receptacles and two trapezoidal blocks), as also other coupling accessories as desired by the customer. Also proof load test of three times of safe working load shall be carried out and a certificate of test shall be supplied with each batch, as provided in IS 8534.

7.3 Eccentricity Test

Axles shall be supported on two fixed blocks (*see* Fig. 1e, Type A), placed at points, approximately to the position of pedestals, axles shall be free to rotate in V-blocks. A fixed point B shall be selected approximately opposite the mid line of the tread of the wheel. The distance between this point and the tread shall not vary more than 4.8 mm, when the wheel is rotated by one revolution.

8 MARKING

8.1 Wheels

Each wheel shall have cast in the back of the flange, the following information in the recessed projected characters not less than 10 mm high:

a) Manufacturer's identification mark;
b) Letter 'C', 'PM' or 'M' to indicate carbon steel, 1.5 percent manganese steel or austenitic manganese steel respectively; and
c) *For tub coupling arrangement* – Each component shall be marked with:
    1) Manufacturer's identification mark;
    2) Safe working load, in kN;
    3) Type of heat treatment given; and
    4) Identification mark bearing reference to manufacturer's certificate of test and examination.

8.2 Draw Gear

8.2.1 Each component of the draw gear shall be marked in accordance with the requirements of IS 8534.

8.2.1.1 Care shall be taken that the indentation is neither too sharp nor excessive in depth.

8.3 Mine Tubs

The information on a name plate suitably mounted on the mine tubs shall indicate,

a) manufacturer's identification mark; and
b) capacity in terms of material to be transported.

8.4 BIS Certification Marking

The mine tub may also be marked with the standard mark of BIS.

8.4.1 The use of the standard mark is governed by the provisions of *Bureau of Indian Standards Act*, 1986 and the rules and regulations made there under. The details of conditions, under which the license for the use of Standard mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Mining Techniques and Equipment Sectional Committee, MED 8

Organization	*Representative*(*s*)
Directorate General of Mines Safety, Dhanbad	Shri G. N. Venkatesh (***Chairman***) Shri R. N. Singh (*Alternate*)
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